

The changing prevalence of upper gastrointestinal endoscopic diagnoses: a single-centre study

R.J.L.F. Loffeld*, B. Liberov, P.E.P. Dekkers

Department of Internal Medicine and Gastroenterology, Zaans Medisch Centrum, Zaandam, the Netherlands, *corresponding author: tel.: +31 (0)75-6502779, e-mail: loffeld.r@zaansmc.nl

ABSTRACT

Introduction: Upper gastrointestinal (GI) endoscopy is increasingly applied in daily practice. Not many data are available on yearly changes in diagnostic yield, nor on changes in morbidity.

Aim: To study the possible changes in occurrence of abnormalities in the oesophagus, stomach and duodenum.

Methods: All consecutive upper GI endoscopies performed over a period of 20 years were included. Important diagnoses were defined as: oesophagitis, metaplastic epithelium in the oesophagus, hiatal hernia or defective sphincter, ulcers, erosive or nodular gastritis, operated stomach, and cancer.

Results: In the 20-year period, 29,218 upper GI endoscopies were performed. 'Open-access' endoscopy, i.e. at the request of the general practitioner, showed a clear increase in the first ten years and remained stable thereafter. A trend towards an increase in macroscopic abnormalities was seen. The presence of hiatal hernia and defective sphincter showed a significant increase over 20 years, while the number of patients with reflux oesophagitis showed a less impressive, but still significant increase ($p < 0.001$) in the first ten years and remained stable thereafter. There was an impressive decrease in the incidence of peptic ulcer disease. Prevalence of oesophageal cancer showed a gradual increase, although the numbers were very low.

Conclusions: In a period of 20 years the diagnostic yield of upper GI endoscopy showed significant changes. Reflux disease increased in prevalence while peptic ulcer disease decreased.

KEYWORDS

Upper GI endoscopy, diagnostic yield, oesophagitis, peptic ulcer disease, epidemiology, endoscopy

INTRODUCTION

Upper gastrointestinal (GI) endoscopy is widely used in normal daily practice. It is considered the investigation of choice in cases of dyspepsia, reflux symptoms or alarm symptoms and is mandatory for a precise diagnosis in cases of these upper abdominal complaints.¹

The advantage of direct visual inspection of the oesophageal, gastric and duodenal mucosa is obvious. Biopsy specimens can be taken for histological or microbiological examination. From many epidemiological studies it is well known that morbidity patterns can show changes in the course of the years. This is known for cancer, cardiovascular diseases and diabetes. In Gastroenterology the incidence of distal gastric cancer and the presence of *H. pylori* is decreasing due to a lower acquisition of the micro-organism. Given these epidemiological data, it is surprising that little is known about the changes in the diagnostic yield of upper GI endoscopy.

In the past, a study was presented on the outcome of upper GI endoscopy in a period of ten years.² The present study is an extension of that study in which the period was doubled to 20 years. Changes in prevalence of important upper GI diagnoses in this period were studied.

MATERIAL AND METHODS

All consecutive diagnostic upper GI endoscopies performed in a period of 20 years in a prospective dataset (January 1992 to December 2011) in the Zaans Medical Centre, the community hospital of the Zaanstreek region, were included. Endoscopies were done at the request of internists, gastroenterologists, and sometimes paediatricians, cardiologists or surgeons. In addition, there is an open-access facility for general practitioners. The

number of inhabitants in the Zaanstreek region increased from 131,262 in 1992 to 146,937 in 2011.

From 1992 until 2006 two gastroenterologists performed all the endoscopies. In 2006 a third gastroenterologist was added to the team.

Endoscopy was performed with Olympus endoscopes (Olympus Nederland BV, Zoetermeer the Netherlands). In 1992 fiberoptic endoscopes were used, from 1993 the EVIS 100 video endoscopes were gradually introduced. Since the beginning of 2000, this system has been gradually replaced by the EXERA 160 and 180 system of Olympus. The procedure was done without sedation or local anaesthesia in 99% of the cases.

The results of the procedure were noted in a written standardised report. From 2003 a custom-made computerised system was used (Endobase™ Olympus). Biopsy specimens were taken to confirm the macroscopic diagnosis if necessary.

Important endoscopic diagnoses were defined as oesophagitis, metaplastic epithelium in the oesophagus, hiatal hernia or defective sphincter closure, ulcer disease, erosive or nodular gastritis, and cancer. In addition, the operated stomach was scored.

Hiatal hernia was defined as a distance of more than 2 cm between the diaphragm and the Z line. Defective or insufficient lower oesophageal sphincter closure was defined as a widely open lower oesophageal sphincter during introduction as well as retrieval of the endoscope with the Z line at the level of the diaphragm. Oesophagitis was scored if erosions or ulceration was present in the oesophagus. Scoring of the oesophagitis was done with the old well-known Savary-Miller system. Endoscopic gastritis was only scored if nodularity or erosions were seen in the antrum.³ Erythema, vascular pattern, rugal hypertrophy, atrophy, and reddish streaks were not taken into account because of the possible inter-observer variability. Barrett's oesophagus was defined as the presence of cylindrical epithelium in the oesophagus.

Each year all endoscopy reports were stored in a prospective computerised database system.

Statistical analysis was done with chi-square test for contingency tables. A value below 0.05 was considered statistically significant. Each table in the chi-square test consisted of the presence or absence of a specific abnormality. The ethics committee of the Zaans Medical Centre approved the study.

RESULTS

In the 20 consecutive years 29,218 upper GI endoscopies were carried out in 13,937 men (48%) and 15,281 women (52%). The mean number of endoscopies per year was 1460 (range 1280-1631) (figure 1).

Figure 1. Number of upper GI endoscopies each year in the last 30 years

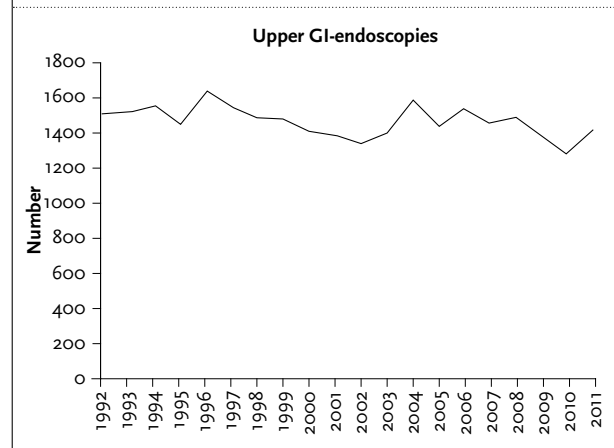
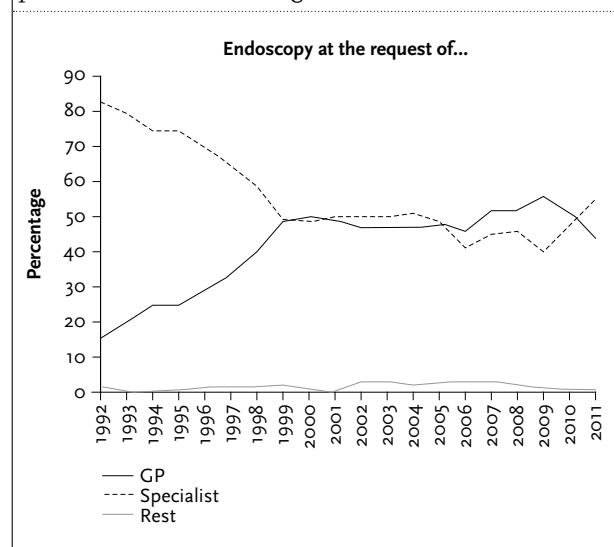


Figure 2 shows that 'open-access' endoscopy, at the direct request of the general practitioner, revealed a clear and significant increase in the first ten years and remained stable thereafter. Obviously, the relative number of procedures performed at the request of the internist and the gastroenterologist showed a parallel decrease in the first ten years.

Of all procedures, 1808 were done because of direct endoscopic follow-up of prior diagnosed abnormalities. This was due to upper GI bleeding or follow-up for gastric ulcer or cancer. The results of these endoscopies were excluded from the present analysis. However, these procedures were included in the analysis of the applicants for gastroscopy.

Figure 2. Number of endoscopies each year at the request of general practitioners, and specialists; rest indicates endoscopies done at the request of surgeons, paediatricians or cardiologists



The overall yield of the upper GI endoscopy in the consecutive years showed a trend towards an increase in macroscopic abnormalities from 61% in 1992 to over 70% at the end of the study. The number of inconclusive endoscopies (i.e. the patient removed the endoscope before adequate inspection was possible or refused the procedure) was low and remained low (mean 15, range 6 to 26 procedures per year).

Hiatal hernia and/or defective lower sphincter closure was seen in a mean of 39% of the procedures (range 29 to 46%), oesophagitis in 16% (range 15 to 21%), Barrett's metaplasia in 3.9% (range 2.2 to 4.9%), gastric ulcer in 1.8% (range 1.3 to 5.6%), duodenal ulcer in 2.1% (range 1.3 to 5.6%), oesophageal cancer in 1.3% (range 0.2 to 1.8%), gastric cancer in 1.1% (range 0.6 to 2.3%), and finally erosive or nodular gastritis in 5.9% (range 2.4 to 10%).

The prevalence of hiatal hernia and insufficient lower oesophageal sphincter closure showed a statistically significant increase in 20 years ($p < 0.001$), while the number of patients with reflux oesophagitis showed a less impressive but still significant increase ($p < 0.001$), especially in the first ten years and remained stable thereafter (figure 3). The prevalence of metaplastic epithelium in the oesophagus did not change in the course of the years. Since 2006 the prevalence of these findings decreased, but this did not affect the trend lines.

Figure 4 shows a very impressive decrease in the prevalence of peptic ulcer disease. In figure 5 the prevalence of oesophageal and stomach cancer in the 20-year period is presented. Prevalence of oesophageal showed a very gradual increase, although the numbers for cancer are low. Figure 6 shows the presence of erosive and/or nodular gastritis.

Figure 3. Relevant endoscopic findings seen in the oesophagus in the consecutive years

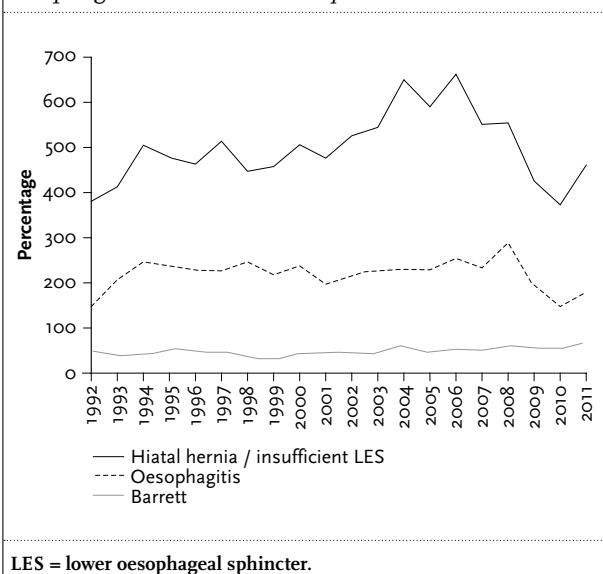


Figure 4. Prevalence of peptic ulcer disease in the consecutive years

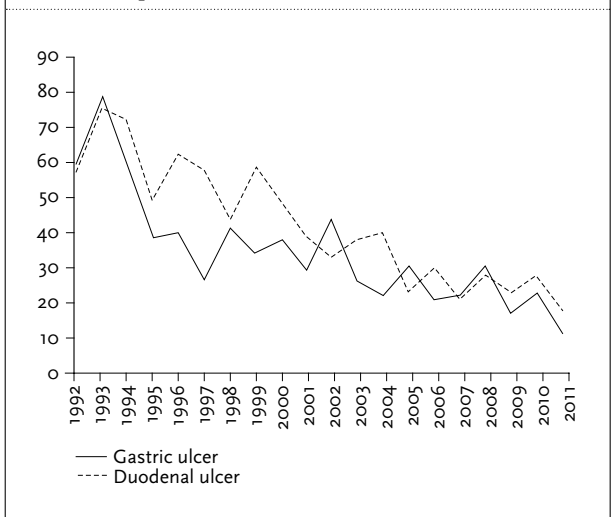


Figure 5. Prevalence of oesophageal and stomach cancer in the consecutive years

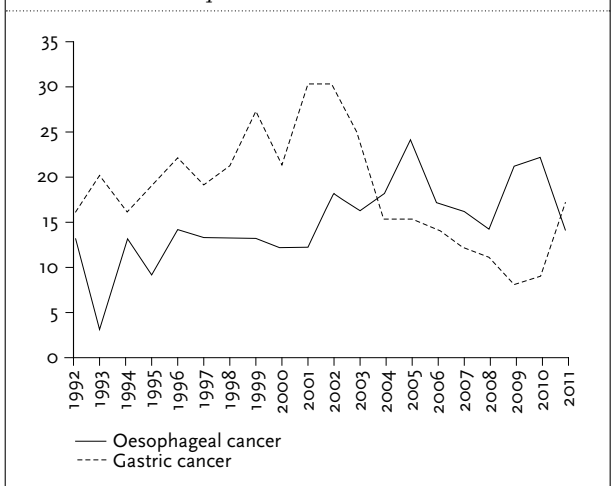
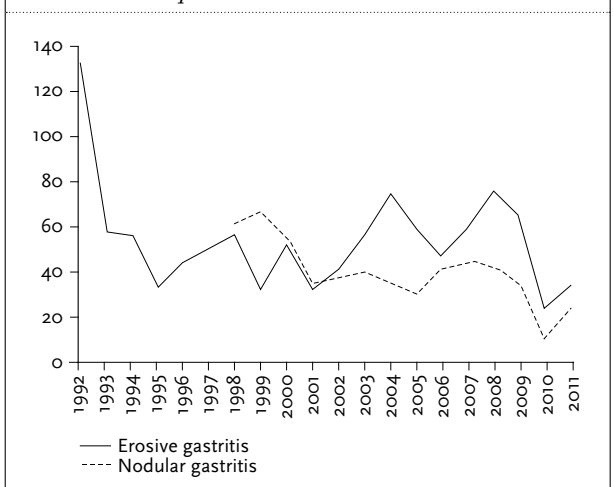


Figure 6. Prevalence of endoscopic signs of gastritis in the consecutive years



DISCUSSION

This study shows the diagnostic yield of upper GI endoscopy in a period of 20 years. It reflects the incidence and prevalence of findings in the oesophagus, stomach and duodenum in the Zaanstreek region. Patients with upper abdominal complaints in the Zaanstreek region are sent to their local regional hospital for diagnosis, i.e. endoscopy, and treatment. There is no waiting time for gastroscopy in the Zaanstreek region. The average time between the decision to do an endoscopy and the actual gastroscopy varies from one to ten days. Hence it can be assumed that not many patients move on to other hospitals in the vicinity, and that the results reflect the upper GI morbidity in the Zaanstreek region. Of course, the population under study shows selection bias because each patient was actually sent for upper GI endoscopy.

With the possibility of open-access upper GI endoscopy at the direct request of the general practitioner, the number of procedures showed a clear escalation in the 1990s.^{4,5} This increasing number of upper GI endoscopies at the direct request of the general practitioner reflects the shift from diagnosis and management of dyspepsia and reflux disease from hospital-based medicine to primary care.

The number of endoscopies revealing no abnormalities is in accordance with the literature.^{6,7} No abnormal macroscopically findings were detected in approximately 27% of cases.

In the first ten years a clear increase in the presence of reflux oesophagitis was noted. In the second period this finding remained rather constant. On the other hand, the trend line for hiatal hernia and defective lower sphincter closure showed an on-going increase in this period. However, the prevalence of hiatal hernia and defective sphincter closure shows a decrease in 2008, 2009, and 2010. In 2011 the prevalence increased. The explanation for this phenomenon is not obvious. But, there were some changes in endoscopists in these years and inter-observer variability could be responsible for the decrease.

Around 17% of the diagnostic procedures revealed oesophagitis. The possible explanation for the steadiness in reflux oesophagitis in the second period of ten years is the fact that according to guidelines in general practice, many patients are already being treated with acid-suppressive therapy before undergoing endoscopy. Since hiatal hernia is a clear and well recognised risk factor for reflux disease, the conclusion can be drawn that the incidence and prevalence of reflux disease has increased in 20 years. The prevalence of Barrett's metaplasia in the oesophagus did not change in the course of the years. Since the development of metaplastic epithelium can be considered the consequence of long-standing reflux, this is surprising. The reason for the steady prevalence could be the fact that most patients with reflux disease are being treated

adequately with acid-suppressive drugs thereby rendering the refluxate less deleterious and taking away the reason for the development of Barrett's metaplasia.

In the course of the 20 years, the prevalence of gastric and duodenal ulcer dramatically decreased. This can be explained by two phenomena. First: the decreasing acquisition of *H. pylori*, the major cause of peptic ulcer disease.⁸⁻¹⁰ Secondly: the fact that patients on long-term NSAID therapy in the Netherlands receive standard gastric protection in accordance with local guidelines, i.e. proton pump inhibitor therapy.

Erosive and nodular gastritis are signs compatible with the presence of active *H. pylori* gastritis. Nodular gastritis was noticed for the first time in 1997 and scored separately, obviously due to the introduction of the video endoscopy. The macroscopic detection of gastritis has improved significantly. The visualisation of the gastric mucosa is much better with the video systems, and more details can be seen. But, in line with the decrease in prevalence of this gastric infection, these signs also decreased.

The diagnosis of Billroth I and II resection also showed a clear decrease in the consecutive years. The reason is very obvious. Since the discovery of *H. pylori* as the major cause of peptic ulcer disease, the reason for doing this anti-ulcer surgery has disappeared.

The number of cases of stomach cancer shows a gradual decrease in the second ten years of the study, while for oesophageal cancer there is a steady increase over 20 years. However, the numbers are too low to draw firm conclusions.

This single-centre study clearly shows major changes in the yield of upper GI endoscopy and hence in morbidity patterns. Especially, the increasing numbers of patients with reflux disease (reflux oesophagitis as well as hiatal hernia or defective lower oesophageal sphincter) implicate a rise in the use of acid-suppressive therapy. On the other hand the acquisition of *H. pylori* is decreasing resulting in a decrease of peptic ulcer disease.

REFERENCES

1. Heikinen MT, Pikkarainen PH, Takala JK, Rasanen HT, Eskelinen MJ, Julkunen RJ. Diagnostic methods in dyspepsia; the usefulness of upper abdominal ultrasound and gastroscopy. *Scand J Prim Health Care*. 1997;15:82-6.
2. Loffeld RJ, van der Putten AB. The yield of UGIE: a study of a ten-year period in the 'Zaanstreek'. *Neth J Med*. 2003;61:14-8.
3. Loffeld RJLF. Diagnostic value of endoscopic signs of gastritis: with special emphasis to nodular antritis. *Neth J Med*. 1999;54:96-100.
4. Scott B, Atkinson M. Gastroenterology services: a regional review of changes over a five year period (1981-1986). *Gut*. 1989;30:695-700.
5. Adang RP, Vismans JF, Talmon JL, Hasman A, Ambergen AW, Stockbrügger RW. Appropriateness of indications for upper gastrointestinal endoscopy: associations with relevant endoscopic disease. *Gastrointest Endosc*. 1995;42:390-7.

6. Mansi C, Mela GS, Savarino V, Mele MR, Valle F, Celle G. Open-access endoscopy: a large-scale analysis of its use in dyspeptic patients. *J Clin Gastroenterol*. 1993;16:149-53.
7. Ayoola EA, al-Rashed RS, al-Mofleh IA, al-Fazeh FZ, Laajam M. Diagnostic yield of upper gastrointestinal endoscopy in relation to age and gender: a study of 10112 Saudi patients. *Hepatogastroenterology*. 1996;43:409-15.
8. Loffeld RJLF, van der Putten ABMM. The occurrence of duodenal or gastric ulcer in two different populations living in the same region: a cross-sectional endoscopic study in consecutive patients. *Neth J Med*. 2001;59:209-12.
9. Loffeld RJ, van der Putten AB. Changes in prevalence of *Helicobacter pylori* infection in two groups of patients undergoing endoscopy and living in the same region in the Netherlands. *Scand J Gastroenterol*. 2003;38:938-41.
10. Loffeld SM, Loffeld RJ. Changing morbidity pattern in oesophagus, stomach and duodenum in Turkish patients: a time-trend analysis. *Neth J Med*. 2010;68:280-4.